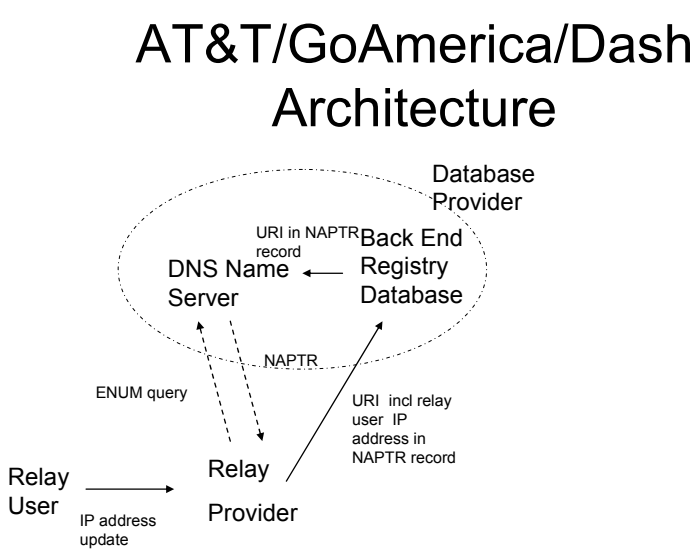
Responses to FCC questions at May 15, 2008 ex parte

1. *Compare the AT&T-GoAmerica-Dash proposed architecture with that of NeuStar and CSD VRS*

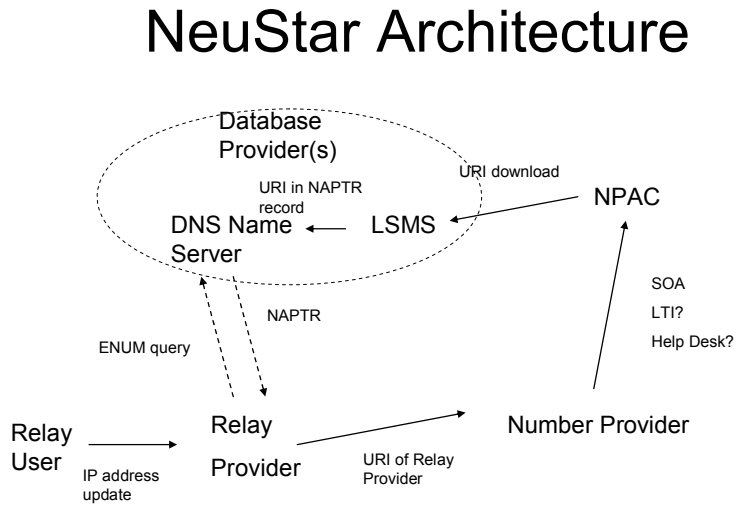
The AT&T-GoAmerica-Dash (hereafter the Joint Proposal) VRS architecture is shown below:



Relay users' equipment continues to update its current IP address to the user's chosen relay provider. The relay provider in turn updates the backend registry database of the database provider. This backend in turns updates the DNS name server(s) that are actually queried by relay providers during call setup when the relay provider is calling the customer of a different relay provider. (Use of backend servers to provision name servers is a standard DNS approach.) Note that what is provisioned by the relay provider into the backend and thence name server is NOT simple the IP address but a URI that contains the IP address in the host portion of the URI. More details of these URIs, which are encapsulated in DNS NAPTR records (the ENUM standard for telephone number translation) are given below. The Joint proposal can also provision URIs/NAPTRs for other IP-based relay services, e.g. IP-based relay services. For VRS, using a URI that includes a user IP

address allows other providers direct access to the user rather than having to go through the designated relay provider.
When relay providers send an ENUM query to the DNS, they get back a NAPTR or set of NAPTRs.

The above approach may be contrasted with that proposed by NeuStar as shown below:

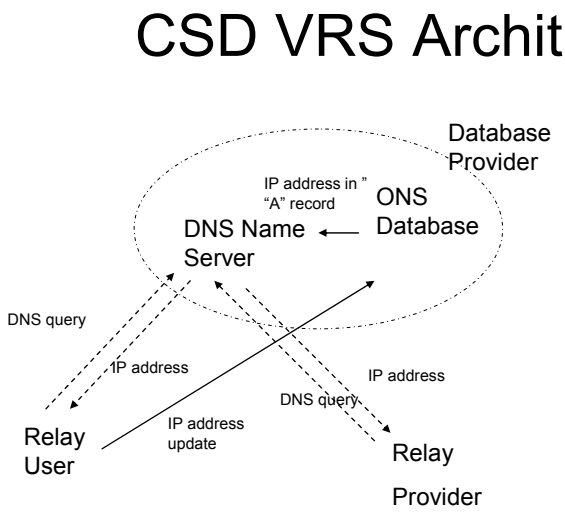


NeuStar proposes to use the NPAC to provision the DNS that is queried by relay providers during call setup. It differs in two major ways. First, what is ultimately provisioned in the DNS is not a URI that points to the end user but instead a URI that points to the user's designated relay provider. So other relay providers must work through that relay provider to get to the end user. (The Joint proposal could accommodate a similar arrangement if it were concluded that was desirable, but the NeuStar proposal can only support an indirect approach.) Second, in the NeuStar proposal the relay provider does not provision the database directly but must instead work through the number provider to provision the NPAC[1]. The NPAC in turn downloads information into a Local Service Management System (LSMS) maintained by one the neutral third party database providers that is allowed to receive such

[1] NeuStar has suggested that relay providers might obtain authorization from their number providers to provision the NPAC directly. AT&T views this as unlikely since such authorization could allow interference with PSTN routing maintained by the number provider. It is not AT&T's practice to allow resellers such access.

data. The LSMS in turn provisions the URI data into NAPTR records in a DNS name server where they can be queried by relay providers. NeuStar provides three interfaces through which a number provider can provision the NPAC, the Service Order Administration or SOA, the Low-Tech Interface or LTI, and the Help Desk. NeuStar concedes that it may be months or year before carriers revise their mechanized SOA interfaces to support the relay URIs because these changes are expensive and take place on fixed development cycles. Many carriers, e.g. AT&T, do not use the LTI because it requires manual interaction and is thus expensive. Finally, the Help Desk charges $15 for each use, is also manual from the carrier perspective and thus unappealing. We note that in other DNS-based applications NeuStar supports, it provides service providers with direct provisioning as envisioned in the Joint Proposal.

The CSD VRS proposed architecture is shown below:



In it, the relay user equipment directly updates its IP address into the ONS database which provisions the DNS server queried during call setup. What is provisioned is an IP address, presumably in a DNS "A" (Address) record. Under the CSD VRS proposal relay users as well as relay providers can query the DNS since it is on the open Internet, unlike the secured DNSs restricted to relay provider access in the Joint and NeuStar proposals. This is a very simple architecture, similar to the one AT&T initially considered but backed off from as a result of security issues (open access of the DNS) and the need

to reconfigure, replace, or supplement with additional hardware each relay's videophone in order to implement.

Unlike either the Joint Proposal or NeuStar, CSD VRS has proposed that the central database provider also provide the PSTN call routing functionality for delivering hearing-originated calls to the a deaf user's designated relay provider. This will require industry specification of additional processes and interfaces between relay providers and the ONS system. (The Joint Proposal and NeuStar have each relay provider making its own arrangements for obtaining numbers and inbound call routing using existing commercial offers.)

Subsequent to the April 29, 2008 FCC Workshop and our ex parte, Telcordia has offered a proposal with an architecture that appears most similar the Joint Proposal in allowing relay providers to directly provision through the Telcordia Service Interconnection Registry the DNS queried (like the Joint and NeuStar proposals by relay providers only) during call set up. It is similar to NeuStar's in initially responding to queries with a URI of the designated relay provider but allows for future evolution to support direct access to end users.

2. Future of Proxy Numbers

AT&T, GoAmerica, and Dash wish to clarify their answer to the question of what would happen to existing proxy numbers in use with relay providers. The future varies depending on the type of proxy number. If the current proxy number is not a legitimate NANP number assigned to the relay user or provider, they should be discontinued as they will cause call routing conflicts that will prohibit successful call completion on either the PSTN as well as within the relay service providers networks. Additionally, these non-legitimate numbers can notbe used to support E911 call handling. On the other hand, if the proxy number is a legitimate NANP number assigned to the relay user or provider, it can simply be ported to the relay provider of choice and can now be directly dialed by hearing parties.

3. The Joint Proposal In Action – System Interaction

The following sections detail the various interactions between relay providers and the Joint Proposal Architecture that take place for number assignment as well as for deaf-to-hearing, deaf-to-deaf, and hearing-to-deaf calls. These diagrams highlight the simplicity of the Joint Proposal and its flexibility.

3a. New Number Assignment – Direct Endpoint (current proposal)

A. Relay end-user contacts relay provider to obtain a new number
B. Relay provider determines appropriate rate center for new number assignment
C. Relay provider assigns number from inventory or orders new number from numbering source. If number is obtained from inventory, no additional updates are required back to number source
D. Relay provider maps new number to end-user's equipment within the relay provider's system.
E. Relay provider's system uses SOA interface to update central database with a NAPTR record specifying the scheme (H323), the endpoint-ip (XXX.XXX.XXX.XXX) and the port if it is different from the protocol default.
F. The number is assigned and available within the central database.
G. The relay provider's system would maintain updates of the endpoint-ip through the SOA interface.

Example REST XML used to update the central database:

```
<addNumber>
    <number>
       <e164>+13035551234</e164>
    </number>
</addNumber>

<addRecord>
    <number>
       <e164>+13035551234</e164>
    </number>
    <record>
       <ruleid>100</ruleid>
       <rulepreference>10</rulepreference>
       <terminal>true</terminal>
       <scheme>H323</scheme>
       <username></username>
       <host>63.245.23.13</host>
```

```
        <port>1720</port>
    </record>
</addRecord>
```

3b. New Number Assignment – Relay Provider Proxied (Future)

(This section describes how the data provisioned would change if the approach of routing all calls through a deaf user's designated relay provider were adopted.)

A. Relay end-user contacts relay provider to obtain a new number
B. Relay provider determines appropriate rate center for new number assignment
C. Relay provider assigns number from inventory or orders new number from numbering source. If number is obtained from inventory, no additional updates are required back to number source
D. Relay provider maps new number to end-user's equipment within the relay provider's system.
E. Relay provider's system uses SOA interface to update central database with an NAPTR record specifying the relay provider's proxy. The record would include at the minimum the scheme (H323), a url formed from the relay provider's proxy (13032288899@proxy.relayprovider.tld) and the port if it is different from the protocol default.
F. The number is assigned and available within the central database.

Example REST XML used to update the central database:

```
<addNumber>
    <number>
        <e164>+13035551234</e164>
    </number>
</addNumber>

<addRecord>
    <number>
        <e164>+13035551234</e164>
    </number>
    <record>
        <ruleid>100</ruleid>
        <rulepreference>10</rulepreference>
        <terminal>true</terminal>
        <scheme>H323</scheme>
        <username>13035551234</username>
        <host>proxy.relayprovier.tld</host>
```

```
      <port>1720</port>
    </record>
</addRecord>
```

3b. Deaf to Hearing Call

A. The relay end-user dials the 10-digit number (assuming a NANP number) of the party she is calling.
B. The call request is sent to the end-user's default relay provider.
C. The relay provider verifies that the number is not a number assigned within its system.
D. The relay provider queries the central database, using either SOAP or ENUM interface
E. The central database returns an empty response, indicating no endpoint exists for the number queried.
F. The relay provider then routes the call out through an interpreter to the hearing user.

3c. Hearing to Deaf Call

A. The hearing user dials the 10-digit number of the relay end-user she is calling.
B. The call is routed by the number source of that 10-digit number to the relay provider that the number is currently assigned to.
C. The relay provider uses its own system to ring the relay-user's endpoint
D. If the end-user answers, the call is connected through an interpreter.
E. Optionally, the call is connected for video or text mail

3d. Hearing to Hearing Call – VP to VP Direct (current proposal)

A. The relay end-user dials the 10-digit number (assuming a NANP number) of the party she is calling.
B. The call request is sent to the end-users default relay provider.
C. The relay provider verifies that the number is not a number assigned within its system.
D. The relay provider queries the central database, using either SOAP or ENUM interface
E. The central database returns an NAPTR record, indicating an endpoint exists for the number queried. The NAPTR point record contains at a minimum the scheme and end-point ip address. The port is optionally specified.
F. The relay provider obtains the endpoint IP from the NAPTR pointer record and instructs the calling end-users endpoint to initiate a call to the ip address obtained from the NAPTR record.
G. A video phone to video phone call connects. The media connects directly between the endpoints.

Example XML returned from a REST query to the central database:

```
<record>
    <ruleid>100</ruleid>
    <rulepreference>10</rulepreference>
    <terminal>true</terminal>
    <scheme>H323</scheme>
    <username></username>
    <host>63.245.23.13</host>
    <port>1720</port>
 </record>
```

Example NAPTR record returned from DNS query to the central database:

```
$ORIGIN 4.3.2.1.5.5.5.3.0.3.1.e164.arpa.

IN NAPTR 100 10 "u" "E2U+h323"
"!^.*$!h323:63.245.23.13!" .
```

3e. Hearing to Hearing Call – VP to VP Proxied

(This section describes how the data provisioned would change if the approach of routing all calls through a deaf user's designated relay provider were adopted.)

A. The relay end-user dials the 10-digit number (assuming a NANP number) of the party she is calling.
B. The call request is sent to the end-users default relay provider.
C. Relay provider verifies that the number is not a number assigned within its own system.
D. Relay provider queries the central database, using either SOAP or ENUM interface
E. The central database returns an NAPTR record, indicating an endpoint exists for the number queried. The NAPTR point record contains the scheme, a url formed from the provider's proxy (13032288899@proxy.relayprovider.tld) and optionally a port if the proxy uses a non-standard port.
F. The relay provider queries DNS to translate the proxy hostname from the NAPTR pointer record to an IP address and instructs the calling end-users endpoint to initiate a call to the phone number at the ip address obtained from the DNS query
G. The VP initiates a call to the destination relay provider's proxy.
H. The destination relay provider looks up the endpoint IP address within its system and routes the call request to the endpoint in question.
I. A video phone to video phone call connects. Depending on the functionality of the destination relay provider's proxy (simple proxy, nat traversal, etc), the media traverses through the destination proxy or is connected directly between the video phones.

Example REST XML returned from query to the central database:

```
<record>
    <ruleid>100</ruleid>
    <rulepreference>10</rulepreference>
    <terminal>true</terminal>
    <scheme>H323</scheme>
    <username>13035551234</username>
    <host>proxy.relayprovier.tld</host>
    <port>1720</port>
 </record>
```

Example NAPTR record returned from DNS query to the central database:

```
$ORIGIN 4.3.2.1.5.5.5.3.0.3.1.e164.arpa.

IN NAPTR 100 10 "u" "E2U+h323"
"!^.*$!h323:13035551234@proxy.relayprovier.tld!" .
```

4. The Joint Proposal In Action – Future Flexibility

In addition to providing a simple interface to support current functionality, the joint proposal supports future functionality and industry growth without requiring additional database changes.

The Joint Proposal approach can support provisioning of any legal DNS resource record – URIs for other services and alternate destinations (including order & preference) can be added without additional development. For NeuStar's NPAC approach on the other hand, the current Change Order 415 before the LNPA supports only SIP and H.323 for VRS – not IP relay. It also requires a new cycle of LNPA/NPAM LLC work and interface development by all parties to add new URIs.

4a. Multiple Protocols With Preferences

The joint proposal allows the relay industry to transition from h323 to SIP over time by supporting multiple protocol entries for each telephone number. A relay provider that supported both SIP and H323 would insert two NAPTR records for a number, specifying that they support SIP as the preferred scheme and h323 as the backup scheme. When another relay provider queries for that number, they would obtain both records. If the call could be supported using SIP, the relay provider would use the SIP record. If the call can only be supported using H323, they would use the h323 record. While this solution clearly requires additional changes by the relay providers, the database supports the functionality today.

Example REST XML returned from query to the central database:

```
<record>
     <ruleid>100</ruleid>
     <rulepreference>10</rulepreference>
     <terminal>true</terminal>
     <scheme>SIP</scheme>
     <username>13035551234</username>
     <host>sipproxy.relayprovider.tld</host>
```

```
        <port>5060</port>
    </record>
    <record>
        <ruleid>100</ruleid>
        <rulepreference>20</rulepreference>
        <terminal>true</terminal>
        <scheme>H323</scheme>
        <username>13035551234</username>
        <host>h323proxy.relayprovider.tld</host>
        <port>1720</port>
     </record>
```

Example NAPTR record returned from DNS query to the central database:

```
$ORIGIN 4.3.2.1.5.5.5.3.0.3.1.e164.arpa.

IN NAPTR 100 10 "u" "E2U+SIP"
"!^.*$!sip:13035551234@proxy.relayprovier.tld!" .
IN NAPTR 100 20 "u" "E2U+h323"
"!^.*$!h323:13035551234@proxy.relayprovier.tld!" .
```

4b. Multiple Devices Same Phone Number With Preferences

The joint proposal allows relay providers that support both video and text relay to allow a user to share a single number between both devices. Again, additional relay provider support is necessary but the central database supports that behavior today. In the example below, the records are stating that the user wishes to be contacted by video phone, but if the video phone can not be reached or the relay user calling does not support video, the user can also be reach by text through their aol.com sign-in.

Example REST XML returned from query to the central database:

```
<record>
    <ruleid>100</ruleid>
    <rulepreference>10</rulepreference>
    <terminal>true</terminal>
    <scheme>H323</scheme>
    <username>13035551234</username>
    <host>sipproxy.relayprovider.tld</host>
    <port>5060</port>
</record>
<record>
    <ruleid>100</ruleid>
    <rulepreference>20</rulepreference>
    <terminal>true</terminal>
```

```
            <scheme>IM</scheme>
            <username>janedoe</username>
            <host>aol.com</host>
        </record>
```

Example NAPTR record returned from DNS query to the central database:

```
      $ORIGIN 4.3.2.1.5.5.5.3.0.3.1.e164.arpa.

      IN NAPTR 100 10 "u" "E2U+SIP"
"!^.*$!sip:13035551234@proxy.relayprovier.tld!" .
      IN NAPTR 100 20 "u" "E2U+IM" "!^.*$!im:janedoe@aol.com!" .
```

5. User Dialing

In response to the question about whether deaf users could directly access the central database and connect directly to other deaf users without going through a relay provider, AT&T, GoAmerica, and Dash believe that security issues argue against this. If the security issues were resolved, the Joint Proposal could support direct dialing. We note, however, that if such access were supported it would best be done by terminal upgrades to allow the user to dial a number resulting in the formulation of a standard ENUM query. Alternatively, records could be added to the DNS to support a more user friendly query format than ENUM, e.g. <phone number>.trs.gov. The NeuStar proposal would not seem to be able to handle such an evolution since the NPAC cannot support dynamic data.